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Upon trying to analyze the so called “Saturnian System”, meaning Saturn, its rings and its natural satellites, information are to be gathered by Saturn itself. After all, the effects of Saturn on the system are greater than the effects of any other astronomical object of it. Specifically, Saturn’s rotational period has not been assigned a standard fixed value yet. That is mainly because of different measurements made by Voyager and Cassini. Nevertheless, it is known that Saturn’s period is to be smaller than 10 hours, 39 minutes and 22 seconds. As a result, using the wide angle camera Cassini spacecraft is equipped with, a direct calculation of Saturn’s period becomes feasible, since the camera will capture images of Saturn for 12 hours. The greatest discrepancy between the two measurements was the period of the interior latitude of the planet, giving rise to several theories trying to explain the cause of change in value. Furthermore, the period of a planet has a great effect on several other constant physical quantities regarding that planet, some of which are related to and directly affect the Saturnian system as a whole, eg the gravitational field strength of the planet.

To start with, by learning the period of the planet, Saturn’s gravitational field strength can be found.
Let’s consider the gravitational field strength on the surface of Saturn, expressed as the centripetal acceleration (g) experienced by an object with tangential velocity v at the surface of Saturn (at a radius (R)).

$$\vec{g} = \frac{\vec{v}^2}{R} = \vec{v}\frac{\vec{v}}{R} = \vec{v}\vec{\omega} = \vec{v}\frac{2\pi}{T}$$

Where T is the period and ω the rotational velocity.
Providing that the object is on the equator of Saturn, it covers a distance of 2πR, where is the radius of the equator at time T. Thus:

$$\vec{g} = \frac{4\pi^2 R}{T^2}$$

However, the real important issue is not the calculation of the period and field strenght. Instead, the outmost important issue is the calculation of the interior rotation period. The two main theories suggested regarding Saturn’s interior rotation period, were that solar winds affected the magnetic field of Saturn, which emitted radio waves in different periods, and, secondly, that the geysers of Enceladus affected the magnetic field of Saturn causing the same result. The key point of Cassini’s current mission is to take advantage of the optical means, the spacecraft carries. Using the wide angle camera enables us to create a video from which the rotational period can be measured in different latitudes, without being altered by either solar winds or Enceladus’ effects. Further by acknowledging the rate of rotation of Saturn, the velocities of Saturn winds can be calculated using the already existing evidence, in addition to the new ones. For the time being, it is known that their velocity will be smaller if a smaller period is recorded. However, only through the expected video from Cassini, it will be feasible to calculate their value.

Ultimately, I firmly believe that Cassini Solstice Mission is to emphasize in determining the period of different latitudes of Saturn, having as major result to the calculation of the interior rotational period and the velocities of Saturn winds.